

REMARKS

Claims 5, 6, 15-19, 29-31, 35, 36, 39-76 and 93-100 are pending in this application, with claims 5, 6, 15, 16, 35, 36, 39 and 40 being independent. Claims 5, 6, 15, 16, 19, 31, 35, 36, 39, 40, 43, 46 and 63-68 have been amended; claims 7, 23, 37, 38, and 77-92 have been canceled; and claims 93-100 have been added.

In particular, independent claims 5, 35 and 39 have each been amended to recite "forming a gate insulating film on the crystallized second amorphous semiconductor film after crystallizing each of the first and second amorphous semiconductor films". Independent claims 5 and 35 have also been amended to incorporate the limitations of their dependent claims 7 and 37, respectively, which are now canceled. Claim 35 has also been amended to clarify that "an element capable of promoting crystallization of silicon" is a metal element.

Independent claims 6, 36, and 40 have each been amended to recite "forming a gate insulating film" and "forming an interlayer insulating film on the crystallized second amorphous semiconductor film after crystallizing each of the first and second amorphous semiconductor films". Independent claims 6 and 36 have also been amended to incorporate the limitations of their dependent claims 23 and 38, now canceled. Claim 36 has also been amended to clarify that "an element capable of promoting crystallization of silicon" is a metal element.

Independent claims 15 and 16 have each been amended to recite "forming a gate insulating film on the second crystalline semiconductor film after crystallizing each of the first and second amorphous semiconductor films." Claims 15 and 16 have also been amended to clarify that "an element capable of promoting crystallization of silicon" is a metal element by reciting "providing a metal element in contact with the first amorphous semiconductor film."

Support for the amendments may be found in the application at, for example, page 52, lines 12 and 13, Fig. 7B, and in now canceled claims 77-92. New claims 93-100 have been added. Support for the new claims may be found in the application at, for example, page 8, lines 20-21. No new matter has been introduced.

Independent claims 5, 35 and 39, and their dependent claims, have been rejected as being unpatentable over Noguchi (JP 04-168769) in view of Shimizu (U.S. Patent No. 5,753,541) or

Tsutsu (U.S. Patent No. 6,118,151). Each of claims 5, 35 and 39 recites "forming a gate insulating film on the crystallized second amorphous semiconductor film after crystallizing each of the first and second amorphous semiconductor films." Applicants request reconsideration and withdrawal of the rejection of claims 5, 35 and 39, and their dependent claims, because neither Noguchi, Shimizu, Tsutsu, nor any proper combination of the three describes or suggests this feature.

Noguchi describes a manufacturing method for a photovoltaic device that includes an amorphous semiconductor layer 2 made of a-SiGe or a-Ge, which the Examiner equates to the recited first amorphous semiconductor film, and an amorphous silicon layer 3, which the Examiner equates to the recited second amorphous semiconductor film. Noguchi, however, does not describe or suggest forming a gate insulating film on the crystallized layer 2 after crystallizing layers 2 and 3. Rather, Noguchi describes using these layers in a photovoltaic device which does not include a gate electrode and, therefore, does not include a gate insulating film.

In rejecting previously pending claim 85, the Examiner referred to Shimizu or Tsutsu to remedy this deficiency of Noguchi. Shimizus describe forming a thin film semiconductor device such as a thin film transistor. The formation of a thin film transistor includes the formation of a gate insulating film because such a film is a necessary component of the transistor. Applicants submit, however, that Noguchi's device is not a transistor but rather is a photovoltaic device, and, therefore, a person of ordinary skill in the art would not have turned to Shimizu's teachings related to forming insulating films for use in a transistor when considering whether and how to modify Noguchi's photovoltaic device.

Moreover, a person of ordinary skill in the art would also not have been motivated to turn to Shimizu's teachings when considering whether to modify Noguchi to form a gate insulating film on layers 2 and 3 after layers 2 and 3 have been crystallized because Shimizu's gate insulating film 7, which the Examiner equates to the recited gate insulating film, is formed before, rather than after, each of the two amorphous semiconductor films on which it is formed

are crystallized. This is shown in Fig. 2 of Shimizu and described in col. 5, lines 33-39 as follows:

Then, in order to convert the amorphous silicon layer 5a and the amorphous germanium layer 6a into polycrystalline to form the polycrystalline silicon layer 5 and the polycrystalline layer 6, respectively, laser light 10 from an excimer layer [sic] was irradiated from the gate insulating film 7 side as seen in FIG. 2 to perform laser annealing.

Thus, even if, for the sake of argument, it were proper to apply Shimizu's teachings to Noguchi's structure, the resulting gate insulating film would be formed prior to crystallization of the two amorphous layers and, therefore, the combination would still fail to satisfy the recited features of forming a gate insulating film on the crystallized second amorphous semiconductor film after crystallizing each of the first and second amorphous semiconductor films.

Tsutsu, like Shimizu, describes forming a thin film semiconductor device such as a thin film transistor, and therefore, also describes the formation of a gate insulating film because such a film is a necessary component of the transistor. As stated above, however, Noguchi's device is not a transistor but rather is a photovoltaic device, and, therefore, a person of ordinary skill in the art would not have turned to Tsutsu's teachings related to forming insulating films for use in a transistor when considering whether and how to modify Noguchi's photovoltaic device.

For at least these reasons, applicants request reconsideration and withdrawal of the rejections of claims 5, 35, and 39 and their dependent claims.

Independent claims 6, 36 and 40, and their dependent claims, have been rejected as being unpatentable over Noguchi (JP 04-168769) in view of Shimizu (U.S. Patent No. 5,753,541) or Tsutsu (U.S. Patent No. 6,118,151). Each of claims 6, 36 and 40 recites "forming a gate insulating film" and "forming an interlayer insulating film on the crystallized second amorphous semiconductor film after crystallizing each of the first and second amorphous semiconductor films." For at least the above reasons, applicants request reconsideration and withdrawal of the rejection of claims 6, 36 and 40, and their dependent claims, because neither Noguchi, Shimizu, Tsutsu, nor any proper combination of the three describes or suggests these features.

Claims 65-68, which depend from claims 35, 36, 39 and 40, have been rejected as being unpatentable over Noguchi in view of Shimizu and Applicant's Admitted Prior Art (AAPA) and

over Noguchi in view of Tsutsu and AAPA. However, AAPA does not remedy the failure of Noguchi, Shimizu and Tsutsu to describe or suggest the subject matter of claims 35, 36, 39 and 40. Accordingly, applicants request reconsideration and withdrawal of the rejection of claims 65-68.

Independent claims 15 and 16, and their dependent claims 17, 29, 63, 64, 71 and 72, have been rejected as being unpatentable over Noguchi in view of Shimizu and AAPA and over Noguchi in view of Tsutsu and AAPA. Independent claims 15 and 16 each recite a method of manufacturing a semiconductor device including, among other features, "forming a gate insulating film on the second crystalline semiconductor film after crystallizing each of the first and second amorphous semiconductor films". For at least the reasons described above, applicants request reconsideration and withdrawal of the rejection of claims 15 and 16, and their dependent claims 17, 29, 63, 64, 71 and 72. In particular, neither Noguchi, Shimizu, Tsutsu, AAPA, nor any proper combination of the four describes or suggests the features of independent claims 15 and 16 noted above.

Claims 43 and 46, which depend from independent claims 39 and 40, have been rejected as being unpatentable over Noguchi in view of Shimizu and Zhang (U.S. Patent No. 5,578,520) and over Noguchi in view of Tsutsu and Zhang. Claims 19 and 31, which depend from independent claims 15 and 16, have been rejected as being unpatentable over Noguchi in view of Shimizu, Zhang, and AAPA, and over Noguchi in view of Tsutsu, Zhang, and AAPA. However, Zhang does not remedy the failure of Noguchi, Shimizu, AAPA, and Tsutsu to describe or suggest the subject matter of claims 15, 16, 39 and 40. Accordingly, applicants request reconsideration and withdrawal of the rejection of claims 19, 31, 43 and 46.

Claims 42 and 45, which depend from independent claims 39 and 40, have been rejected as being unpatentable over Noguchi in view of Shimizu and Maekawa (U.S. Patent No. 6,066,547) and over Noguchi in view of Tsutsu and Maekawa. Claims 18 and 30, which depend from claims 15 and 16, have been rejected as being unpatentable over Noguchi in view of Shimizu, AAPA and Maekawa, and over Noguchi in view of Tsutsu, AAPA and Maekawa. However, Maekawa does not remedy the failure of Noguchi, Shimizu, Tsutsu and AAPA to

describe or suggest the subject matter of claims 15, 16, 39 and 40. Accordingly, applicants request reconsideration and withdrawal of the rejection of claims 18, 30, 42 and 45.

Claims 47, 48 and 51-54, which depend from claims 5, 6, 35, 36, 39 and 40, have been rejected as being unpatentable over Noguchi in view of Shimizu and Kunii (JP 04-163910), over Noguchi in view of Shimizu and Cho (JP 11-340473), over Noguchi in view of Tsutsu and Kunii, and over Noguchi in view of Tsutsu and Cho. However, Kunii and Cho do not remedy the failure of Noguchi, Shimizu, and Tsutsu to describe or suggest the subject matter of claims 5, 6, 35, 36, 39 and 40. Accordingly, applicants request reconsideration and withdrawal of the rejection of claims 47, 48 and 51-54.

Claims 49 and 50, which depend from claims 15 and 16, have been rejected as being unpatentable over Noguchi in view of Shimizu, AAPA and Kunii, over Noguchi in view of Shimizu, AAPA and Cho, over Noguchi in view of Tsutsu, AAPA and Kunii, and over Noguchi in view of Tsutsu, AAPA and Cho. As stated previously, AAPA, Cho, and Kunii do not remedy the failure of Noguchi, Shimizu, and Tsutsu to describe or suggest the subject matter of claims 15 and 16. Accordingly, applicants request reconsideration and withdrawal of the rejection of claims 49 and 50.

Independent claims 5, 6, 15, 16, 35, 36, 39 and 40, along with their dependent claims 19, 31, and 41-68, also have been rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 7, 50, 51, 59, 60, and 66 of U.S. Patent No. 6,482,684 ("the '684 patent") in view of Noguchi and AAPA. Applicants request reconsideration and withdrawal of this rejection because the following features now recited in amended claims 5, 6, 15, 16, 35, 36, 39 and 40 are not described or suggested by claims 1, 7, 50, 51, 59, 60 and 66 of the '684 patent: "forming a gate insulating film on the crystallized second amorphous semiconductor film after crystallizing each of the first and second amorphous semiconductor films" (claims 5, 35 and 39); "forming an interlayer insulating film on the crystallized second amorphous semiconductor film after crystallizing each of the first and second amorphous semiconductor films" (claims 6, 36 and 40); and "forming a gate insulating film on

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the second crystalline semiconductor film after crystallizing each of the first and second amorphous semiconductor films" (claims 15 and 16).

Applicants do not acquiesce to the characterizations of the art. For brevity and to advance prosecution, however, applicants have not addressed all characterizations of the art, but reserve the right to do so in further prosecution of this or a subsequent application.

Applicants submit that all claims are in condition for allowance.

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